

B¹ (Twice Amended) One preferred thermoplastic material, Konduit OTF-212-11, was made into a thermoplastic body and tested for its coefficient of linear thermal expansion by a standard ASTM test method. It was found to have a CLTE in the range of -30 to 30°C of 1.09×10^{-5} in/in °F in the X direction and 1.26×10^{-5} in/in °F in both the Y and Z directions, and a CLTE in the range of 100 to 240°C of 1.28×10^{-5} in/in °F in the X direction and 3.16×10^{-5} in/in °F in both the Y and Z directions. (Hence, the relevant CLTEs for purposes of defining the invention are 1.09×10^{-5} in/in °F and 1.28×10^{-5} in/in °F.) Another similar material, Konduit PDX -0-988, was found to have a CLTE in the range of -30 to 30°C of 1.1×10^{-5} in/in °F in the X direction and 1.46×10^{-5} in/in °F in both the Y and Z directions, and a CLTE in the range of 100 to 240°C of 1.16×10^{-5} in/in °F in the X direction and 3.4×10^{-5} in/in °F in both the Y and Z directions. By contrast, a PPS type polymer, (Fortron 4665) was likewise tested. While it had a low CLTE in the range of -30 to 30°C (1.05×10^{-5} in/in °F in the X direction and 1.33×10^{-5} in/in °F in both the Y and Z directions), it had a much higher CLTE in the range of 100 to 240°C (1.94×10^{-5} in/in °F in the X direction and 4.17×10^{-5} in/in °F in both the Y and Z directions).

IN THE CLAIMS

Please rewrite claims 1-14, 16 and 20-44 as follows without prejudice, and add new claims 45-49 as follows.

- B² 1. (Twice amended) A [high speed spindle] motor [for a disc drive] comprising:
- a) a shaft having a rotational axis;
 - b) a hub attached to the shaft and including a permanent magnet;
 - c) a bearing allowing rotation of the hub about the rotational axis of the shaft;
 - d) a stator comprising conductors; and
 - e) a monolithically formed body that substantially encapsulates the stator conductors, wherein a thermoplastic material is injection molded to form the body and the body is configured to align the shaft, hub and bearing with respect to the stator; and mounting features are formed in the body to mount the motor to a device to be powered by the motor.

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cont

2. (Amended) The motor of claim 1 wherein the body surrounds the bearing.
3. (Amended) The motor of claim 1 wherein the bearing comprises an upper bearing and a lower bearing.
4. (Amended) The motor of claim 3 wherein the body substantially surrounds the upper bearing and the lower bearing.
5. (Amended) The motor of claim 1 wherein the shaft is fixed relative to the body.
6. (Amended) The motor of claim 1 wherein the shaft is freely rotatable relative to the body.
7. (Amended) The motor of claim 1 wherein the mounting features are configured to allow the motor to be mounted to a hard disc drive.
8. (Amended) The motor of claim 1 wherein an insert is substantially encapsulated within the body.
9. (Amended) The motor of claim 1 wherein the permanent magnet is concentrically disposed around the stator.
10. (Amended) The motor of claim 1 wherein the stator concentrically surrounds the permanent magnet.
11. (Amended) The motor of claim 1 wherein a second magnet is substantially encapsulated within the body.
12. (Twice amended) The motor of claim 11 wherein the second magnet is an enhancement magnet.
13. (Twice amended) The motor of claim 11 wherein the second magnet is part of a magnetic bearing.
14. (Twice amended) A high speed spindle motor for a disc drive comprising:
 - a) a shaft;

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- b) a disc support member attached to the shaft;
- c) a bearing disposed around the shaft;
- d) a stator; and

e) a monolithically formed body that substantially encapsulates the stator, the monolithically formed body surrounding the bearings and the shaft, the body being formed by injection molding and being made of a material having a coefficient of linear thermal expansion of less than 2×10^{-5} in/in °F throughout the range of 0-250°F.

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16. (Amended) The high speed motor of claim 15 wherein the body concentrically surrounds the upper bearing and the lower bearing.

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20. (Amended) A high speed spindle motor for a disc drive comprising:
a) a shaft;
b) a disc support member attached to the shaft and including a permanent magnet;
c) a bearing surrounding the shaft;
d) a stator; and
e) a monolithically formed body that substantially encapsulates the stator, wherein a thermoplastic material is injection molded to form the body, the material has a coefficient of thermal conductivity of at least 0.7 watts/meter°K at 23°C and the body is configured to align the shaft, disc support member and bearing with respect to the stator.

21. (Amended) The motor of claim 1 wherein the bearing is fixed to the body.

22. (Amended) The motor of claim 1 wherein the hub comprises a disc support member and the shaft is fixed to the disc support member.

23. (Amended) The motor of claim 1 wherein the stator further comprises a core and the conductors induce magnetic fields in the core when current is conducted by the conductors.

24. (Amended) The motor of claim 23 wherein the core comprises steel laminations.

25. (Amended) The motor of claim 23 wherein the core has a plurality of poles and the conductors comprise windings around said poles.

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cont. 26. (Amended) The motor of claim 1 wherein the bearing comprises ball bearings.

27. (Amended) The motor of claim 26 wherein the motor comprises a high speed spindle motor and the bearings comprise oversized bearings having an outer diameter of over 13 mm.

28. (Amended) The motor of claim 1 wherein the bearing is a hydrodynamic bearing.

29. (Amended) The motor of claim 1 wherein the motor is able to operate at at least 10,000 rpm.

30. (Amended) The motor of claim 8 wherein the insert provides structural rigidity to the body.

31. (Amended) The motor of claim 8 wherein the insert enhances heat transfer away from the bearing and the stator.

32. (Amended) The motor of claim 1 wherein a first portion of a magnetic bearing is substantially encapsulated within the body and a second opposing portion of the magnetic bearing is attached to the hub.

33. (Amended) The motor of claim 32 wherein the body has been machined to provide precise tolerance between the first and second portions of the magnetic bearing.

34. (Amended) The motor of claim 8 wherein the insert enhances dampening of motor vibration.

35. (Amended) The motor of claim 8 wherein the insert enhances dampening of audible noise.

36. (Amended) The motor of claim 8 wherein the shaft is fixed to the body and the insert is positioned between the shaft and the bearing.

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37. (Amended) The motor of claim 1 wherein the thermoplastic material includes ceramic particles.

38. (Amended) The motor of claim 1 wherein the thermoplastic material has a coefficient of linear thermal expansion of less than 2×10^{-5} in/in °F throughout the range of 0-250°F.

39. (Amended) The motor of claim 1 wherein the thermoplastic material has a coefficient of linear thermal expansion of less than 1.5×10^{-5} in/in °F throughout the range of 0-250°F.

40. (Amended) The motor of claim 1 wherein the thermoplastic material has a coefficient of linear thermal expansion of between about 0.8×10^{-5} in/in °F and about 1.2×10^{-5} in/in °F throughout the range of 0-250°F.

41. (Amended) The motor of claim 1 wherein the bearing comprises steel, the hub comprising aluminum and the thermoplastic material has a coefficient of linear thermal expansion that is between the coefficient of linear thermal expansion of the steel and the coefficient of linear thermal expansion of the aluminum.

42. (Amended) The motor of claim 1 wherein the thermoplastic material comprises polyphenyl sulfide.

43. (Amended) The motor of claim 1 wherein the shaft is fixed to the thermoplastic body by being molded with the stator in the thermoplastic body.

44. (Amended) The motor of claim 1 wherein the bearing is fixed to the thermoplastic body with a press fit.

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45. (New) A high speed spindle motor for a disc drive comprising:
a) a shaft having a rotational axis;
b) a disc support member attached to the shaft and including a permanent magnet;

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Amended.

c) a bearing allowing rotation of the disc support member about the rotational axis of the shaft;

d) a stator; and

e) a monolithically formed body that substantially encapsulates the stator, wherein a thermoplastic material is injection molded to form the body and the body is configured to align the shaft, disc support member and bearing with respect to the stator; and wherein the shaft is fixed to the body and an insert is substantially encapsulated within the body and is positioned between the shaft and the bearing.

46. (New) The motor of claim 8 wherein the insert is rigidly fixed to the stator by the body and is connected to the stator only through the thermoplastic material.

47. (New) The motor of claim 46 wherein the shaft is fixed to the insert by being substantially encapsulated by the thermoplastic material.

48. (New) The motor of claim 46 wherein the bearing is fixed to the insert by being substantially encapsulated by the thermoplastic material.

49. (New) The motor of claim 1 herein said mounting features comprise apertures.

REMARKS

The amendment does not involve new matter. The changes to the specification and amended claims from the previous version to the rewritten version are shown in Appendix A, with brackets for deleted matter and underlines for added matter. Pages 27-28 were amended to correct a typographical error, in that "Fortron 4665" is a PPS polymer, rather than a PBS polymer. Since the preamble in claim 1 was not given patentable weight, the preamble of claim 1 and the claims that depend thereon have been amended to reflect the meaning the Examiner ascribed to it. The other changes in claim 1 are supported by the specification, page 7, lines 22 and 27-28; page 12, lines 23-25; page 32, lines 3-7 and original claim 7. Claims 14 and 38-40 have been amended to use the same units for the coefficient of linear thermal expansion as were used in the previous amendment to the specification. New claim 45 is patterned after